

Professional Virtual Communities and cooperation, collaboration from AI and organizational sciences perspective

Servane Crave France Telecom Orange Labs

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research & development



Agenda

1. Introduction to PVC and VT
2. From Communication to Collaboration
3. Forms of coordination to support cooperation & collaboration
4. Conclusion & discussion

1 ■ Introduction to PVC and VT

Some basic definitions

- Communities?
- Virtual Communities?...Rheingold (1993)
- In and out a company.
- The unit is the individual i.e the knowledge worker
- What does this imply?
 - Develop a social identity
 - Share, increase and create knowledge
 - With a business orientation (direct or indirect)
 - The value of a business oriented VC is innovation

- But how does it work?

The PVC Mission

- The PVC mission consists in generating value through members' interaction, sharing and collaboration.

- The generated value consists of:
 - Advanced Knowledge
 - Professional services
 - Social capital

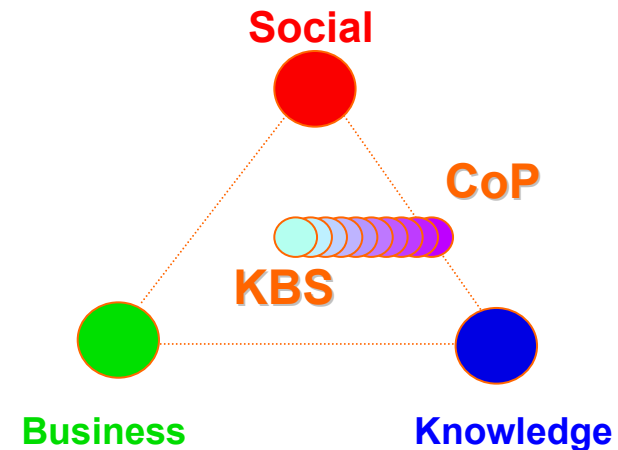
- The PVC value system accounts for an appropriate balance of the Knowledge, Business and Social (KBS) dimensions.

- The PVC is designed to
 - best deliver innovation
 - maximize the realization of individuals

From Communities of Practice (CoPs) to PVCs

The lack of an explicit business dimension may:

- jeopardizes members' motivation and even viability to spend significant time in the community activities
- reduces the scope of community activities
- impedes a *deep* sharing and an *actual co-development* of knowledge and competences
- induces mistrust because of hidden Companies' or members' business interests
- Prevent individuals and their companies to accrue the economic value which is actually generated through the community activities.

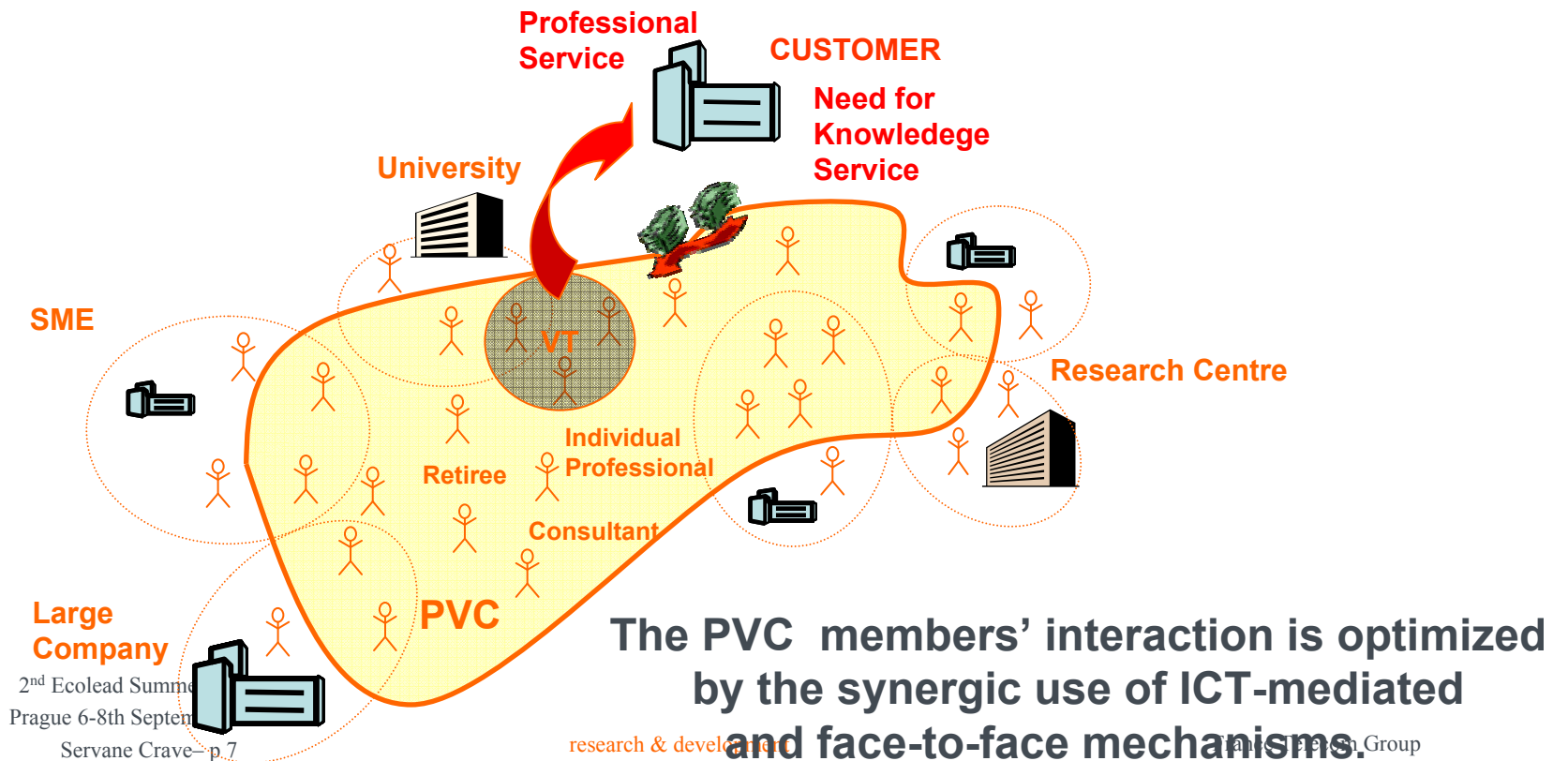


The KBS chromo-framework

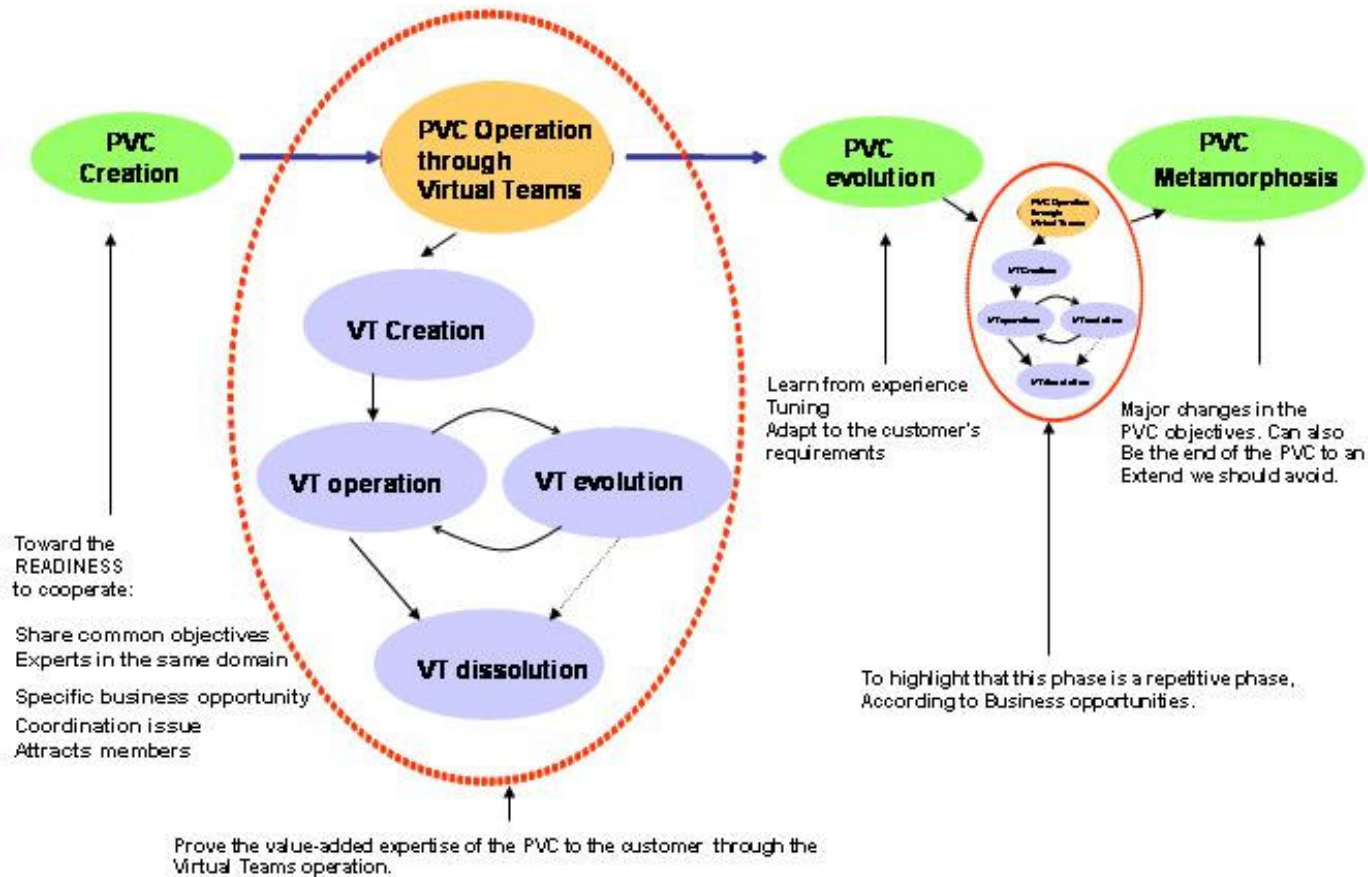
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The ECOLEAD PVC

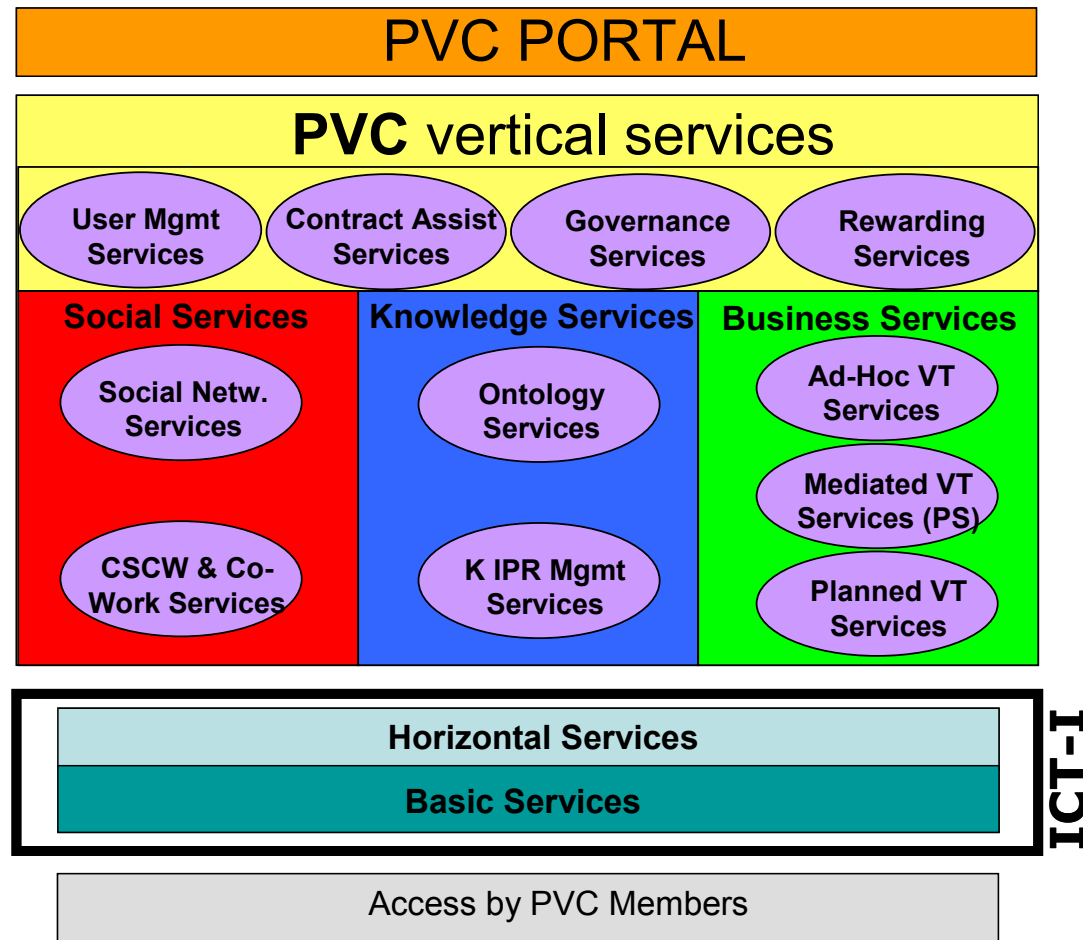
Association of “individuals” (knowledge workers)
identified by a specific knowledge scope
with an explicit business orientation



The PVC life-cycle



ICT Vertical Services for PVCs



Supporting the social dimension

- Social Networking services
- CSCW services

Supporting the Knowledge dimension

- Ontology services
- Knowledge IPR management services

Supporting the Business dimension

- Ad-hoc VT services
- Mediated Services VT (Problem solving)
- Planned VT services

Key challenges associated to PVC

- Managing interdependencies represented by tacit interactions among actors and complex tasks
- Bring more flexibility...but implies organizational changes.
- Cooperation is critical since they have to engage in boundary-spanning activities in addition to accomplishing their on-going work.
- Counterbalance reduced or no f2f meetings
- Importance of norms (expected patterns of behavior that reflect ways of acting that have been accepted as legitimate by members of a group, Hare 1976)

=> uncertainty

2. From Communication to Collaboration

The 3Cs

■ From Coordination to Collaboration

PVC



	Coordination	Cooperation	Collaboration
Purpose of this approach	Avoid gaps & overlaps in individuals' assigned work	Obtain mutual benefit by sharing or partitioning work	Achieve collective results that the participants would be unable to accomplish alone
Desired outcome	Efficiently-achieved results and meeting objectives	Same as coordination plus savings in time and cost	Same as for cooperation, plus innovative, extraordinary, breakthrough results, and collective "we did that!" accomplishment
Examples	Project to implement off-the-shelf IT application; traffic flow regulation	Operating a local community-owned utility or grain elevator; coping with an epidemic or catastrophe	Brainstorming to discover a dramatically better way to do something; co-creation

From efficiency to innovation



Fig.1: desired outcome and examples (adapted from Pollar 2005)

3Cs

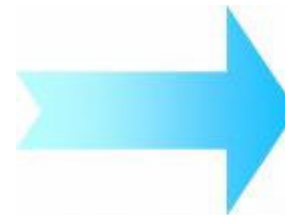
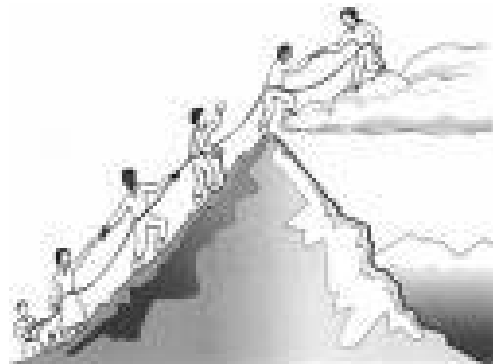
- 3 Cs with a mathematical metaphor:
 - Coordination: $1+1=1$
 - Cooperation: $1+1=2$
 - Collaboration: $1+1=3$

- ...collaboration greatly increases the potential of individuals, and triggers innovation

What is collaboration?

- Collaboration entails finding the right group of people (skills, personalities, knowledge, work-styles, and chemistry), ensuring they share commitment to the collaboration task at hand, and providing them with an environment, tools, knowledge, training, process and facilitation to ensure they work together effectively (Pollar 2005)
- Shared goal, sense of urgency and commitment, productive participation process, sense of belonging, open communication, trust.

From Cooperation



To Collaboration



Example n°1

Van Gogh & Gauguin - Two artists, both coming late to their art after failing at other professions, who met and worked together and helped each other develop the technique and mastery that has endured ever since



**L'Église d'Auvers sur Oise,
1890, Musée d'Orsay**

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Fatata Te Miti, (1892)

Example n°2 et n°3

- The Human Genome project - 15 years international collaboration that fast-tracked scientific advances that would otherwise have taken at least a generation longer



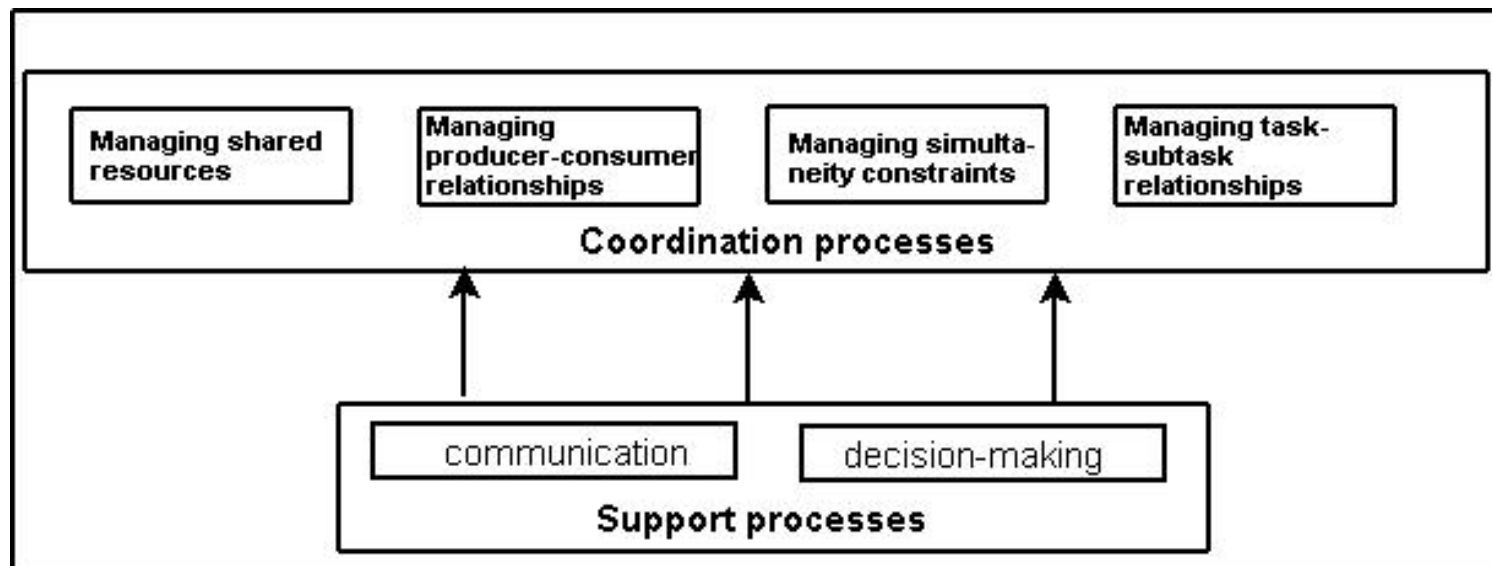
- Open Source Software - Like Mozilla Firefox, Thunderbird and nVu, simple internet softwares, developed by parallel and sequential work of hundreds individuals



3. Forms of coordination to support cooperation & collaboration

General overview of Coordination Theory

Set of tasks and processes by which groups of actors carrying out Activities manage interdependencies in order to perform effectively as a group
(Malone & Crowston 1990)



(Malone 1990)

Overview of methods for analysing coordination processes

<i>Coordination process</i>	<i>Computer Science</i>	<i>Economics and Operations Research</i>	<i>Organization Theory</i>
Managing shared resources (including task assignments)	techniques for processor scheduling and memory allocation	analyses of markets and other resource allocation mechanisms; scheduling algorithms and other optimization techniques	analyses of different organizational structures; budgeting processes, organizational power, and resource dependence
Managing producer / consumer relationships (including prerequisites and usability constraints)	data flow and Petri net analyses	PERT charts, critical path methods; scheduling techniques	Participatory design; market research
Managing simultaneity constraints	synchronization techniques, mutual exclusion	scheduling techniques	meeting scheduling; certain kinds of process modeling
Managing task / subtask relationship	modularization techniques in programming; planning in artificial intelligence	economies of scale and scope	strategic planning; management by objectives; methods of grouping people into units

Areas of CPS in the context of VT

Proposition	Description	Key concepts	example
1. Distributed solving of problems	The total expertise is distributed among all the agents, each one having only restricted skills in relation to the complete problem to be solved. Ferber calls this: "cooperation between specialists".	Specialists Complementary skills Solving mode distributed among actors Need for complex expertise	Adapted to VT aiming at developing innovation
2. (distributed) Solving of distributed problems	In this proposition, it is the problem itself which is distributed, agents can have similar skills	Essentially refers to applications such as analysis, identification, fault finding and the control of physically distributed systems for which it is difficult to obtain a totally centralised overall view	Adapted to cross borders VT for centralizing expertise/competences from different locations, different countries. Members can have same or complementary competences
3. Distributed techniques for problem solving	Usage of interactions between agents to solve problems. This relates to solving by coordination.	Well formulated problem Availability of data to solve the problem Domain and expertise aren't distributed Used for optimal allocation of resources to tasks	Adapted to VT with well defined objectives enabling. The objective is to optimize the efficiency. Search of optimisation for the allocation of tasks where the domain and the expertise are not distributed.

Definition of the coordination objectives:

- Maximize the network coherence (how well distributed members of a team work together).
- Allocate tasks and resources among members
- Recognise and resolve disparities or conflicts in goals, facts, beliefs and behaviour of members
- Define the optimal organisational structure (defining roles, responsibilities and chains of coordination/execution between members). Two modes of coordination can therefore appear: one unique coordinator with several executors or a set of executors acting each as coordinators. Each one of the coordination modes presents advantages and disadvantages according to the nature of the PVC and to the autonomy of its members. Distributing coordination tasks among VT members implies a strong project management and trust among members to ensure that the different tasks will be achieved on the due time.

CPS and forms of coordination

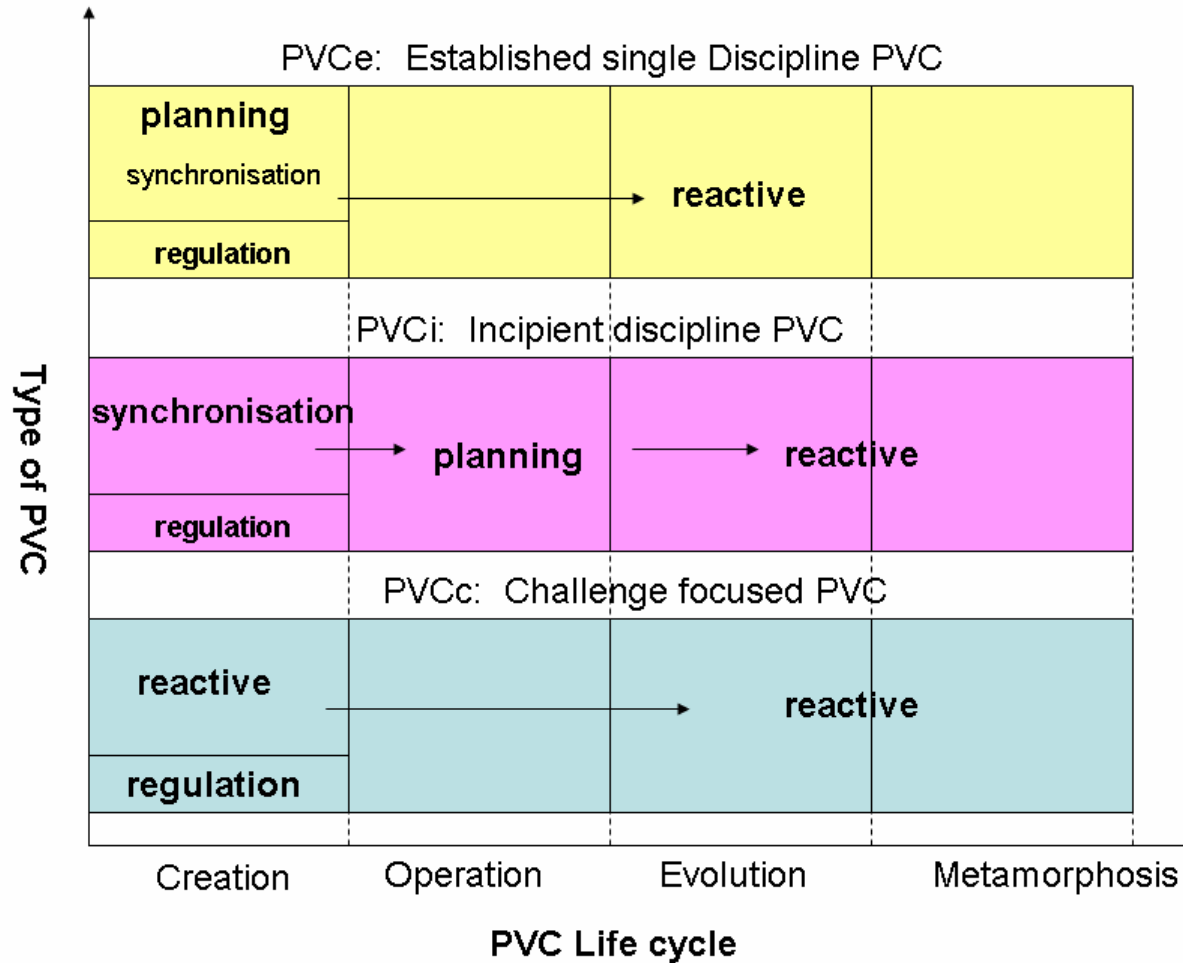
- **Coordination by synchronization:** is the elementary form of coordination. The way in which the actions follow on from each other is very important and all coordination of actions has to describe this precisely, which induces a necessary synchronization. Synchronization is quoted when it comes to manage the simultaneity of several actions.
- **Coordination by planning:** this mode of coordination is a step by step approach with 3 main phases and is the most traditional in AI:
 - definition of the set of actions to be done to reach the objective with the production of different plans
 - execution of the accepted plan
 - dynamic replanning according events which can occur during its execution
- **Reactive coordination:** this mode of coordination favors in situ implementation of actions instead of a priori. Mainly used in situations where it is difficult to anticipate what is going to happen (evolutionary contexts) but may present constraints in term of optimization of the results.
- **Coordination by regulation:** enact set of rules of good behavior among actors in order to avoid all kind of conflicts

Ferber's values of parameters in relation to forms of coordination.

	Synchronisation	Planning	Reactive	Regulation
Rapidity	Very good	Poor	Very good	Good
Adaptability	Very poor	Poor	Very good	good
Predictability	Poor	Very good	Poor	Average
Centralisation/distribution	Immaterial	Immaterial	Immaterial	Centralised
Mode of communication	Messages	Messages	Stimuli/marks	Immaterial
Freedom of action	Very limited	Limited	Great	Rather limited
Quality of coordination	Rather good	Very good	Rather good	Rather good
Avoidance of conflicts	Good	Good	Poor	Good
Number of agents	High	Low	Very high	High
Quantity of exchanges	Average	High	Low	Low
Mutual representations	Limited	Numerous	Limited	Limited
Difficulty of implementation	Average	Great	Small	Average
Heterogeneity	Low	Very low	High	Average
Generalisation	Poor	Average	Average	average

4. Conclusion and discussion

Which coordination and when?



Synthesis: linking AI/Coordination Theory in the frame of PVC and VT

Type of problem solving	Competences	Resources	Coordination process involved
1. Distributed solving of problems	Insufficient (as each actor can't on his/her own achieve the objective)	sufficient	. Managing producer consumer relationships
		insufficient	. Managing producer consumer relationships . Managing Shared resources
2. (distributed) Solving of distributed problems (mandatory local resolution of problems)	sufficient	sufficient and not shared	. Managing simultaneity constraints
3. Distributed techniques for problem solving	sufficient	sufficient	. Managing Task/subtask relationships

Thanks for your attention!

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